

## **Questioning demand: a study of regretted purchases in Great Britain**

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### **Abstract (<150 words)**

This paper presents findings from a nationally representative household survey on the tendency to regret purchases across 20 product groups. The survey reveals that the vast majority of adults in Great Britain (82%) have regretted a purchase in the past. Post-purchase regret is shown to be particularly prevalent for clothing & footwear and takeaway food. The tendency to regret purchases appears to reduce with age and to be more common amongst white collar rather than blue collar workers. Combining survey results with average price estimates gives an estimated, aggregate, annual expenditure on regretted purchases of £5-25bn, equivalent to 2-10% of annual consumer spending in Great Britain. These findings are interesting because they suggest that there is a degree of self-assessed over-consumption that, if reduced, could help to reduce pressures on the environment.

### **Keywords (<6 words)**

Regret; regretted purchases; buyer's remorse; demand reduction; over consumption; environmental policy

## 1. Introduction

The choices that people make over what to buy can invite judgment: *"Few economists in recent years can have escaped some uneasiness over the kinds of goods which their value system is insisting they must maximize"* (Galbraith 1958 p.463). Evidence that 18% of food and drink brought into UK households is wasted (Quested et al., 2012) and that 30% of clothes bought by UK consumers are left unworn at home (Gracey and Moon, 2012) serves to bolster such judgments, however, judging the worthiness of different types of consumption goes against the libertarian principles of free market economics: *"Nothing in economics so quickly marks an individual as incompetently trained as a disposition to remark on the legitimacy of the desire for more food and the frivolity of the desire for a more expensive automobile"* (Galbraith, 1958 p.467). Within this value system, policy-makers tend to err away from making judgments regarding consumption, their justification being that waste and the under-utilisation of products may be desirable because they afford benefits such as convenience, flexibility and choice.

Nevertheless, critically evaluating our consumption practices is important if we are to limit climate change. Within the UK, the indirect greenhouse gas (GHG) emissions embodied in the demand for goods and services account for approximately a third of the total GHG emissions attributed to the UK using the consumption method (Barrett and Scott, 2012). If the highly ambitious agreement to limit global temperature increases to below 2 °C adopted at COP21 in Paris last year is to be achieved, there is no doubt that radical changes to patterns of demand will be required. Indeed, taking into account the cumulative emissions already released, this target may already be out of reach without immediate, rapid, deep reductions in emissions in the order of 10% per annum in wealthier, industrialised nations (Anderson and Bows, 2011). Given the time needed to plan, commission and construct large-scale energy supply infrastructure and the technical and commercial uncertainty associated with large scale implementation of carbon sequestration technology, the necessary reduction in emissions cannot be achieved through supply-side solutions alone (Anderson et al., 2014).

The environmentally extended economic models (including energy systems models, macroeconomic models and integrated assessment models) that are used to identify potential pathways to meeting GHG emission reduction targets evaluate the relative costs and benefits associated with different emission reduction options. For a given emissions reduction target these, predominantly neoclassical, models optimise the allocation of abatement effort across supply- and demand-side alternatives by maximizing a measure of social welfare. They tend to put greater emphasis on supply-side options for reducing emissions. For example, 87% of the pathways that are consistent with limiting warming below 2°C considered for the IPCC's 5th Assessment Report require net negative emissions delivered by supply-side carbon sequestration technologies (Fuss et al., 2014) despite assuming per capita growth in GDP (Clarke et al., 2014 pp. 419 and p.425). Emphasis is put on supply-side solutions partly because these models make highly ambitious assumptions regarding the technical and economic feasibility of supply-

side change, and partly because they assume that the initial level of demand is desirable and so associate any reduction in demand with a welfare loss.

Within this context, this paper explores the tendency of consumers to regret purchases. Post-purchase regret presents the possibility that there are opportunities to reduce demand for goods - and so the embodied GHG emissions associated with this demand - at a lower welfare loss. It also begs the question whether there are other types of demand reduction, for example relating to demand that emanates from habitual or satisficing decisions, that would carry reduced welfare losses. Questioning demand in this manner - i.e. asking whether demand for product services is desirable - is a natural progression from existing demand-side emissions abatement strategies that have sought to improve energy efficiency (reducing energy input for a given unit product service (Cullen et al., 2011)) and material efficiency (reducing demand for embodied emissions intensive materials for a given unit product service (Allwood et al., 2011)). The paper addresses the following questions:

- How frequently do consumers in Great Britain regret purchases across a range of products? (Section 4.1)
- Approximately how much is spent on purchases that are later regretted? (Section 4.2)
- What types of consumers are more likely to regret purchases? (Section 4.3)
- Why do consumers tend to regret purchases? (Section 4.4)

The next section explores how this study fits alongside existing research in the field of consumption and regret.

## **2. Literature review**

This section draws on extensive reviews of the literature on regret (by Zeelenberg and Pieters (2007) and Connolly and Butler (2006)) and on the history and theory of consumption (by (Trentmann, 2016) and Miller (1995a)) to critically examine whether self-reported regret is likely to offer a useful means of questioning demand. The section is structured to consider arguments relating to the motivation (Section 2.1), method (Section 2.2) and policy relevance of the proposed study (Section 2.3).

### **2.1 Why study regretted purchases?**

#### **2.1.1 Regret as a symptom of market failure**

Regretted purchases could be symptomatic of underlying market failures and other distortions that should be addressed to ensure that markets operate efficiently. For example, a high incidence of post-purchase regret could be indicative of asymmetric information (we would expect buyers of “lemons” in George Akerlof’s seminal paper (Akerlof, 1970) to regret their

purchases), of built-in-obsolescence (Packard, 1960), of advertisers acting as the “merchants of discontent” (Packard, 1957), or of short-sighted consumers who are increasingly overwhelmed by too many choices (Schwartz, 2004). Past work has identified over-consumption due to missing markets (the absence of futures markets for many goods and the fact that many types of risk bearing do not exist) and environmental externalities (Arrow et al. (2004)). The study of regretted purchases adds an additional dimension to this notion of over-consumption.

### **2.1.2 Regret as an expression of individual choice under uncertainty**

The expression of individual choice is central to libertarian ethics, forms the basis of neoclassical economics (Smith, 1776) and underpins neoliberalism (Hayek, 1944; Friedman and Friedman, 1980). Asking respondents to reflect on whether they have regretted purchases invites people to judge their own choices rather than cast judgment on others and so is consistent with these value systems. Regretted purchases can be seen as a refined expression of personal choice following reflection on the experience of owning a product. The original purchasing decision is re-evaluated taking into account any new information gleaned since purchase, including information on the performance and use of the product relative to expectations and information on the perceived benefit of alternative purchasing strategies (e.g. delaying purchase in anticipation of sales or buying an alternative product). A degree of regret could be seen to be an inevitable consequence of consumption decisions that are taken under uncertainty.

### **2.1.3 Individual regret v. socially-rooted consumption practices**

Individual consumption decisions are influenced by and have implications for wider society. Thorstein Veblen famously stressed the social nature of consumption, describing acts of “conspicuous consumption”, “vicarious consumption” and “conspicuous leisure” (Veblen, 1899). Tastes and preferences are socially formed and consumption is used as a signal of class (Bourdieu, 1984). Empirical life satisfaction (or “happiness”) studies suggest that satisfaction is derived from relative rather than absolute consumption (Layard, 2005) and that people who are better at directing their consumption patterns are happier (Matz et al., 2016). To demonstrate the far reaching social implications of consumption, Daniel Miller gives an ironic account of a housewife as global dictator, wielding great power over the developing world as she goes about her shopping applying her skills of thrift (Miller, 1995b pp.8–9). If consumption is eminently social, is a measure of personal regret too individualistic? As put by Jon Elster “Why should individual want satisfaction be the criterion of justice and social choice when individuals themselves may be shaped by a process that pre-empt the choice?” (Elster, 1982 pp219).

### **2.1.4 Regret of prosaic behaviours?**

People are unlikely to regret the prosaic activities that have the most significant impact on GHG emissions. As explained by (Trentmann, 2016 pp.15) “...from an environmental perspective, the moral equation of private excess and public waste is too convenient. Carbon-dioxide emissions

from hot showers and baths, heating and cooling the home to ever higher standards of comfort, rushing from place to place, are far more than those from luxury yachts and accessories...‘waste’ does not stem from morally suspect forms of consuming. A lot of it comes from practices that are considered ‘normal’”. Any of the prosaic activities that have the largest impact on greenhouse gas emissions relate to habitual behaviours that consumers are less likely to think about let alone re-evaluate and regret. Nevertheless, given the scale of the challenge to limit climate change outlined in the introduction, it follows that all behaviours (not just those with the largest impact) should be subject to scrutiny.

## **2.2 Will surveying regret yield meaningful results?**

### **2.2.1 Existing surveys of regret**

To our knowledge, there are no existing nationally representative surveys of self-reported regretted purchases. Much of the academic work on regretted decisions has been conducted in an experimental setting first prescribing “regret” to particular experimentally induced eventualities (e.g. in the literature on extended expected utility theory developed by Lee (1971), Bell (1982) and Loomes and Sugden (1982)) and later asking participants about their feelings (or expected feelings) in different experimentally induced situations (in the “Psychological Regret Tradition” as defined by Connolly and Butler (2006)). Specifically in the field of regretted purchases (also referred to as “buyer’s remorse”), studies have focused on how the (usually experimentally induced) experience and anticipation of regret influences repurchasing intentions (for example Tsiros and Mittal (2000)), brand choice and purchase timing (for example Simonson (1992)). There is nevertheless a precedent for surveying self-reported regret stemming from other types of decisions, for example: (Fong et al., 2004) surveyed regret amongst smokers across four countries; (Oswalt et al., 2005) surveyed sexual regret amongst college students; and, (Gilovich and Medvec, 1994) surveyed regrets due to actions versus regrets due to inactions.

### **2.2.2 Misreporting regret**

With all surveys there is a risk that respondents will not answer truthfully. The theory of cognitive dissonance, proposed by Festinger (1957), is based on the idea that people seek consistency between their beliefs, attitudes and behaviours and that the effort to maintain this consistency may give rise to irrational behaviour. With reference to regretted purchases a dissonance may arise from the inconsistency between the voluntary decision to buy a product and any ensuing feeling of regret. Consumers may opt to reduce the resulting tension by choosing not to admit their regrets or believing that they will be short-lived. Consequently, it is likely that, on balance, there is a tendency to under-report regret in surveys, with people answering with respect to instances of regret that immediately spring to mind, and that they are willing to admit to themselves, rather than fully evaluating their past consumption history.

### 2.2.3 Different types of regret

Zeelenberg and Pieters (2007) provide a definition of ‘regret’ as “the emotion that we experience when realizing or imagining that our current situation would have been better, if only we had decided differently. It is a backward looking emotion signalling an unfavourable evaluation of a decision. It is an unpleasant feeling, coupled with a clear sense of self blame concerning its causes and strong wishes to undo the current situation”. Within this definition, regretted purchases could take multiple forms e.g. “I wish I hadn't bought it”, “I wish I hadn't bought this one, I should have chosen a different one”, “I frequently regret one particular purchase” or “I wish I had bought more”. These different interpretations of regret are likely to cause problems for interpreting survey results. Even more problematic for the idea of using regret as an indicator of an overall misallocation of resources, is the notion that the relationship between consumer and product may change over time as suggested by Arjun Appadurai who describes how meaning (and so value) is ascribed to goods “in their forms, their uses, their trajectories” (Appadurai, 1986 pp.5) and fostered by Kate Fletcher's idea of the “craft of use” (Fletcher, 2016). This much more fluid account of the value of products could see post-purchase regret as being transient: the consumer valued the product (so they bought it), they later regretted it, but they may come to value it again in the future.

## 2.3 Could regret influence behaviours?

### 2.3.1 Regret as a behavioural regulator

A key theoretical development in the study of regret has been a change in the interpretation of regret from a failure of judgment or psychological error, to the characterisation of regret as a powerful behavioural regulator (Epstude and Roese, 2008). People who are averse to regrets will try to avoid them and consequently feelings of regret are expected to influence future decisions both retrospectively (through the experience of past regret - “once bitten twice shy”) and prospectively (through the anticipation of regret) (Zeelenberg and Pieters, 2007). By this argument, promoting greater reflection on regretted purchases could motivate people to avoid regretted purchases in the future. Conversely, if the fear of regret limits consumption, tackling regret (for example by improving take-back services) could counter-intuitively increase demand.

### 2.3.2 Policy based on emotions?

Once recognised, post-purchase regret could be used by policymakers to influence or “nudge” behaviours to try to avoid regret through policies governed by the principle of libertarian paternalism (Thaler and Sunstein, 2003). However, there are some concerns with using emotions as a basis of policy. With reference to the happiness agenda (Skidelsky and Skidelsky, 2012 pp.97) write “Generally speaking, happiness is good only where it is due; where sadness is due it is better to be sad. To make happiness itself, independent of its objects, the chief goal of

government is a recipe for infantilisation....We do not want to banish the engineers of growth only to see them replaced by the engineers of bliss". A similar argument could be directed at a policy aimed at reducing regretted purchases, especially given the potentially transient nature of regrets.

### **2.3.3 Potential policy conflicts**

Within the current economic climate, governments around the world are focused on stimulating demand with a view to returning to a state of growth around which economies (their labour markets, debt structures, housing markets, pension provisions etc) have been configured. The link between fostering demand and employment is explained by Beckerman (1956 pp.112) "When unemployment was officially admitted in academic economics, the question of whether or not economics should be limited... to the study of the allocation of scarce means among competing ends was somewhat pushed into the background, for the relevant question became one of getting rid of certain surplus means- particularly labour! In an economy, such as the United States of America, where leisure is barely moral, the problem of creating sufficient wants (i.e., competing ends) to absorb productive capacity may become chronic in the not too distant future.". If the social, environmental and economic objectives of sustainable development are to be met simultaneously, it seems vital that employment objectives are addressed independently of the perpetual creation of wants. Nevertheless, until this decoupling occurs, inviting a reduction in regretted purchases could have punishing implications for people's livelihoods.

### **2.3.4 Incremental v. radical change**

As outlined in the introduction, the scale of the challenge of meeting our climate change objectives necessitates radical changes in patterns of demand. Within this context, asking respondents whether they regret a purchase may be too incremental. It does not invite respondents imagine a radically different context in which the particular purchase would no longer be necessary to them. This present study of regretted purchases therefore conforms with the ABC (Attitudes, Behaviour, Choice) model of choice that is criticized by Shove (2010) in her call for greater use of social theory in environmental policy. Her proposed alternative "transitions and practices led" approach "suggests that transitions towards sustainability do not depend on policy makers persuading individuals to make sacrifices, specified with reference to taken-for-granted benchmarks of normal non-sacrifice...Instead, relevant societal innovation is that in which contemporary rules of the game are eroded; in which the status quo is called into question; and in which more sustainable regimes of technologies, routines, forms of know how, conventions, markets and expectations take hold across all domains of daily life" p.1278.

## **2.4 Summary**

This literature review has revealed some opposing characterisations of regret that moderate the potential contribution of this study. Studying regret is helpful if regret is characterised as a

symptom of wider market failures, but less helpful if regret is characterised as an unavoidable outcome of purchasing decisions that are made under uncertainty. Studying regret is helpful as it maintains individual choice and so is palatable to libertarians, but is less helpful as regret is an emotion that may be transient and as people are less likely to regret the prosaic behaviours that have the largest environmental impact. Studying regret is helpful if people are motivated to reduce their regrets once they are aware of them, but less helpful as it invites incremental rather than radical change. Recognising these limitations, this study can only represent one part of a wider, ongoing body of work on the potential for demand reduction.

### **3. Methods**

This section describes the household survey method (Section 3.1) and data analysis techniques (Section 3.2) used in this study. Information on where to access both the R code and the underlying data is available in the Supplementary Information section at the end of the paper.

#### **3.1 Household survey**

The questions outlined in Table 1 were included in the omnibus survey run by the professional opinion pollster Yougov. The omnibus survey is run daily and consists of a medley of questions from different research projects that are put to a pre-selected panel of over 2,000 respondents who are given a small financial incentive to complete the survey. This particular omnibus survey was run on 19<sup>th</sup> March 2015 and took approximately 15 minutes to complete online, paying respondents 75p for their contribution. Aside from the questions on regretted purchases, this omnibus included questions on: private medical insurance, UK oil & gas; medical diagnoses and the Discovery Channel. Responses were obtained from 2036 people. Although it would have been preferable to have a dedicated survey, the omnibus approach was deemed to be the most cost-effective means of obtaining nationally representative results for this short set of questions.



Question	Sub-question	Responses
(1) To what extent do you agree or disagree with the following statements?	<ul style="list-style-type: none"> <li>I enjoy shopping, even when I'm not looking for something in particular</li> <li>I'm very conscious of cost and finding the cheapest option is my number one priority</li> </ul>	<ul style="list-style-type: none"> <li>Strongly agree</li> <li>Tend to agree</li> <li>Neither agree nor disagree</li> <li>Tend to disagree</li> <li>Strongly disagree</li> <li>Don't know</li> </ul>
<p>(2) Thinking of when you have bought the following products in the past. How often, if ever, did you later regret your purchase?</p> <p><i>Please choose the option that best applies.</i></p> <p><i>This question was preceded by the statement: "For the following question by 'regret', we mean you wished that you hadn't bought something in the first place, for any reason".</i></p>	<ul style="list-style-type: none"> <li>Fresh fruit &amp; vegetables</li> <li>Confectionary such as chocolate, cakes &amp; biscuits</li> <li>Milk</li> <li>Meat</li> <li>Takeaways</li> <li>Alcohol</li> <li>Tobacco</li> <li>Cosmetics, health &amp; beauty goods</li> <li>Clothing &amp; footwear</li> <li>Newspapers, books &amp; stationary</li> <li>Electronic devices (e.g. mobile phones, cameras, tablets, e-readers, games consoles and TVs etc.)</li> <li>Kitchen gadgets (e.g. bread makers, pasta makers &amp; mixers etc.)</li> <li>'White' goods (e.g. fridges, washing machines etc.)</li> <li>Sports &amp; exercise equipment, including bikes</li> <li>Gardening &amp; DIY equipment/products</li> <li>Arts, crafts &amp; other hobby equipment</li> <li>Baby &amp; children's toys &amp; equipment (e.g. prams, baby baths, baby carriers &amp; toys etc.)</li> <li>Vehicles</li> <li>Other grocery items</li> <li>Other goods including furniture, soft furnishings, ornaments &amp; collectables etc.</li> </ul>	<ul style="list-style-type: none"> <li>More than a couple of times in the last year</li> <li>A couple of times in the last year</li> <li>Just once in the last year</li> <li>In the past but not in the last year</li> <li>I've bought this product, but never regretted it</li> <li>Don't know/can't recall</li> <li>Not applicable – I've never bought this type of product</li> </ul>
<p>(3) You said that you have regretted buying [product group] in the past. Why did you regret making these purchases?</p> <p><i>Please select all reasons that apply.</i></p>	<ul style="list-style-type: none"> <li>Groceries, takeaways, alcohol and tobacco</li> <li>Clothing and footwear</li> <li>Consumer durables</li> </ul>	<ul style="list-style-type: none"> <li>On reflection, I couldn't really afford it</li> <li>I was enticed by an offer or an advert and didn't really need it</li> <li>It wasn't right for me after all or wasn't as good as I expected it to be</li> <li>I didn't use it as much as I expected to</li> <li>On reflection the product didn't fit with my wider health, environmental or social concerns</li> <li>I later found something out that made me regret my purchase (e.g. I saw it on offer or saw another superior product)</li> <li>I had to throw it away as it was perishable and went off</li> <li>Other, please specify...</li> <li>Don't know/can't recall</li> </ul>

**Table 1: Overview of survey questions**

Two rounds of pilot surveys (with samples of 10-20 people) were run to formulate the survey questions in Table 1. The 20 product categories included in Question 2 were chosen to cover all household expenditure on goods. Given the high environmental impact associated with food consumption (shown to be responsible for 30% of global GHG emissions (Bajželj et al., 2013)),

multiple categories were used for food purchases, singling out particular food items that carry a higher environmental impact (“Meat” and “Milk”), are considered healthy (“Fruit & vegetables”) and unhealthy (“Confectionary such as chocolates, cakes & biscuits”). The possible reasons for regret offered in Question 3 were drawn from a literature review including studies of regret (as reviewed for example by Zeelenberg and Pieters (2007) and Connolly and Butler (2006)) and surveys of waste behaviours (including Gracey and Moon (2012), Quested et al. (2012) and Parry et al. (2014)).

### 3.2 Analysis

The following steps were taken to prepare and analyse the survey data:

*Estimating the propensity to regret purchases (as reported in Section 4.1):*

- *Data cleaning:* Prior to the analysis the survey data were inspected and the sample was cleaned by removing: respondents who simply selected the first response to each question in the omnibus survey; respondents who selected “Don’t know” in response to all questions; and, respondents who reported regretting buying vehicles on multiple occasions in the last year. In total 41 respondents were excluded from the analysis, reducing the sample size from 2036 to 1995.
- *Applying population weights:* As the questions were put to a pre-selected panel rather than to a random sample, sample weights were applied to ensure that the findings were representative of the population of Great Britain. Sample weights ranged from 0.3 to 4.0. These weights are inverse to the probabilities of including an element in the sample: population characteristics that are under-sampled are given a higher weight; population characteristics that are over-sampled are given lower weights.
- *Calculating the cross-product propensity to regret:* The propensity for respondents to regret purchases across all product categories was calculated to identify, for example, the share of respondents that had regretted at least one purchase in any of the product categories in the last year.

*Estimating the economic cost of regretted purchases (as reported in Section 4.2):*

- *Regret frequency assumptions:* The assumptions outlined in Table 2 were made to translate loose statements regarding regret frequency e.g. “A couple of times in the last year” (Q2 Table 1) into estimates of the number of times a purchase had been regretted. Two types of assumptions were made: literal assumptions (made for most goods); and, more generous assumptions (made for food and clothing purchases as these tend to be more frequent).
- *Base case purchase price assumptions:* Supplementary data were gathered from a range of sources to give an estimate of prices of purchases made in each of the 20 categories. These estimates are reported as “Base case” price estimates in Table 3. They vary in quality from food price estimates reported by ONS (2015) (gathered from large samples of approximately 350 products and thought to be reasonably robust), to estimates of the prices of electronic

devices (based on the average price of the top 5 bestsellers within the product category on Amazon and considered to be crude estimates).

	<i>"More than a couple of times in the last year"</i>	<i>"A couple of times in the last year"</i>	<i>"Just once in the last year"</i>	<i>"In the past but not in the last year"</i>
Literal minimum assumptions (all goods bar those below)	3	2	1	0
More generous assumptions (food, clothing & footwear)	6	4	1	0

**Table 2: Interpretation of frequency scales: number of purchases assumed for each response**

- *High and low purchase price assumptions:* Given the uncertainty over the above mentioned "Base case" price estimates, a second method was used to generate a range of credible price estimates for each product category. Data on average household expenditure (reported in column 1 Table 3) were used to calculate different implied average product prices by varying assumptions about the average frequency of purchases per person. For example, as reported in Table 3, the average household spends £22.60 per week on clothing & footwear. If each adult within the household were to buy on average one item of clothing per week, the implied price per item would be £11.30 (the "Low price" estimate reported in Table 3). Alternatively if each adult within the household were to buy on average one item of clothing per month, the implied price per item would be £48.43 (the "High price" estimate reported in Table 3). Expenditure data, frequency assumptions and the resulting high and low price estimates are reported for each category in Table 3. This process is subjective but it ensures that the product prices assumed are consistent with reported expenditure data across a range of credible average purchase frequency assumptions.
- *Estimating expenditure on regretted purchases:* Approximate estimates of expenditure on regretted purchases were obtained by cross-multiplying the pricing assumptions outlined in Table 3 by the frequency of regret (based on responses to Q2 Table 1 and the frequency interpretations in Table 2). The expenditure on regretted purchases was compared to total expenditure in each product category.

*Identifying types of consumers that are more likely to regret purchases (as reported in Section 4.3)*

- *Creating a dichotomous overall regret variable:* A binary overall regret variable was created and set equal to one if respondents had regretted at least one purchase across all products at some point in the past. The variable was set equal to zero if respondents chose "I've bought this product, but never regretted it" in response to all products in Q2 Table 1. Respondents who had not purchased any of the products or who answered "Don't know" to all products were excluded from this sample.
- *Creating a dichotomous product level regret variable:* The dataset was reformatted from wide format (one row per respondent) to long format (one row per product per respondent) and a

binary regret variable was created at the product level using the methods described above for the overall regret variable.

- *Regression analysis:* Two logistic regressions were run to observe the relationship between the two dichotomous regret variable, a set of socio-demographic variables provided by yougov and two attitudinal variables that measured shopping enjoyment and cost consciousness based on responses to Q1 Table 1. Full details of these models and their results are given in Section 4.3.

Product category	Expenditure <sup>a</sup> (£/hh/week)	Base case	High price		Low price	
		Price <sup>c</sup> (£/unit)	Price (£/unit)	Freq.	Price (£/unit)	Freq.
Clothing & footwear	22.60	9.81	48.43	1/p/m	11.30	1/p/w
Newspaper, books & stationary	5.30	12.07	11.36	1/p/m	1.33	2/p/w
Electronic devices	5.10	82.00	132.60	1/p/y	10.93	1/p/m
Kitchen gadgets	--	40.49	65.48	--	5.40	--
White goods	3.10	142.00 <sup>d</sup>	403.00	1/p/5y	161.20	1/p/2y
Sports & exercise equipment	0.90	26.04	117.00	1/p/5y	23.40	1/p/y
Gardening & DIY equipment	4.60	17.64	119.60	1/p/y	29.57	1/p/3m
Arts, crafts & other hobby equipment	--	49.60	168.80	--	33.39	--
Baby & children's toys & equipment	--	14.44	49.14	--	9.72	--
Cosmetics, health & beauty goods	3.80	10.13 <sup>i</sup>	24.43	1/p/3m	1.90	1/p/w
Vehicles	21.10	2,465.00 <sup>e</sup>	5,486.00	1/p/10y	1097.20	1/p/2y
Fresh fruit & vegetables	10.20	0.58 <sup>f</sup>	2.55	2/p/w	0.36	2/p/d
Confectionary	6.10	1.00 <sup>g</sup>	3.05	1/p/w	0.44	1/p/d
Milk	2.40	0.78 <sup>f</sup>	1.20	1/p/w	0.17	1/p/d
Meat	13.00	2.83 <sup>f</sup>	6.50	1/p/w	0.93	1/p/d
Takeaways	8.14 <sup>b</sup>	16.28 <sup>b</sup>	17.70	1/p/m	4.07	1/p/w
Alcohol	7.70	3.85 <sup>f</sup>	8.25	2/p/m	1.93	2/p/w
Tobacco	4.30	8.72 <sup>f</sup>	9.21	1/p/m	2.15	1/p/w
Other grocery items	27.10	1.00 <sup>g</sup>	13.55	1/p/w	1.94	1/p/d
Other goods	59.96	25.78 <sup>h</sup>	64.24	2/p/m	29.98	1/p/w
Services (excluded from this study)	271.60	--	--	--	--	--

**Table 3: Sources of supplementary data**

<sup>a</sup> Source: ONS (2014) unless otherwise stated

<sup>b</sup> Source: Defra (2014) \* average household size

<sup>c</sup> Source: Average price of top 5 bestsellers within product category on [www.amazon.co.uk](http://www.amazon.co.uk) accessed 31/03/15 unless otherwise stated

<sup>d</sup> Source: Cheapest option for each appliance type (fridge-freezer, washing machine, tumble dryer, dishwasher) at [www.currys.co.uk](http://www.currys.co.uk) accessed 31/03/15

<sup>e</sup> Source: Average UK price of private used car sales 2013 (The University of Buckingham, 2015) n.b. dealer's used car selling prices are higher averaging £7,660

<sup>f</sup> Source: ONS (2015) making quantity assumptions see SI

<sup>g</sup> Source: Typical supermarket offer

<sup>h</sup> Source: Average of all price estimates stated excluding food and vehicles

<sup>i</sup> Source: Average of top 5 bestsellers [www.boots.com](http://www.boots.com)

*Identifying why consumers regret purchases (as reported in Section 4.4):*

- *Recoding and analysing “Other, please specify...” responses:* Where respondents chose to offer other reasons for having regretted purchases in the past (Q3 Table 1), these responses were analysed and, where possible, recoded into the seven broad reasons for regret. Responses that did not fit the pre-defined reasons for regret were gathered and summarised.
- *Distinguishing between reasons that imply a “re-evaluated need” and reasons that imply “regretted choice”:* The predefined reasons for regret were grouped according to Table 4 to distinguish between regretted purchases that implied the consumer wished they had bought an alternative product (referred to as a “Regretted choice”) and regretted purchases that implied that the consumer wished that they had bought nothing at all (referred to as a “Re-evaluated need”). This allocation is subjective and, where there was doubt, priority was given to the “Regretted choice” category. For example, the statement “On reflection, I couldn’t really afford it” could be interpreted as a re-evaluated need (e.g. “I wish I hadn’t bought anything”) or a regretted choice (“I wish I’d bought something cheaper”) and the latter interpretation is taken here. The relative importance of these types of regret was then calculated for the three broad product areas.

Re-evaluated need	Regretted choice
I had to throw it away as it was perishable and went off.	It wasn’t right for me after all or wasn’t as good as I expected it to be.
I was enticed by an offer or an advert and I didn’t really need it	On reflection the product didn’t fit with my wider health, environmental or social concerns
I didn’t use it as much as I expected to	On reflection, I couldn’t really afford it
	I later found something out that made me regret my purchase (e.g. I saw it on offer or saw another superior product)

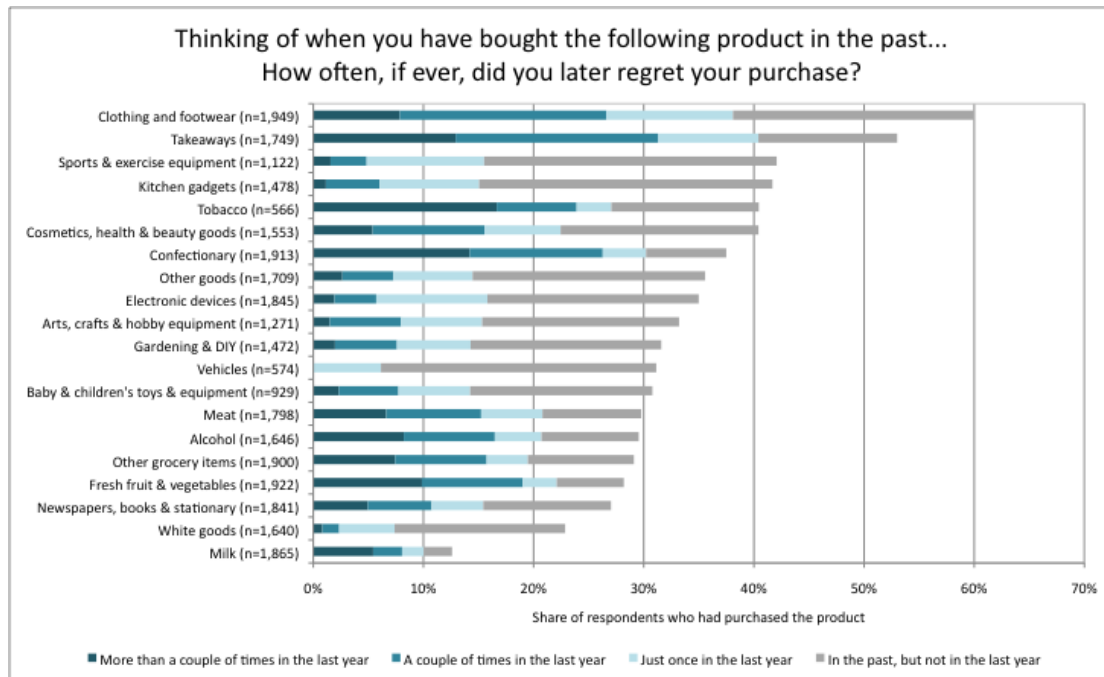
**Table 4: Grouping reasons for regret**

## 4. Results

The findings presented in this section are representative of the adult population of Great Britain.

### 4.1 The propensity to regret purchases across different product groups

The survey revealed that 82% of adults had regretted a purchase in the past, and 67% had regretted a purchase in the last year. Figure 1 shows the frequency with which respondents reported regretting purchases across 20 product categories.



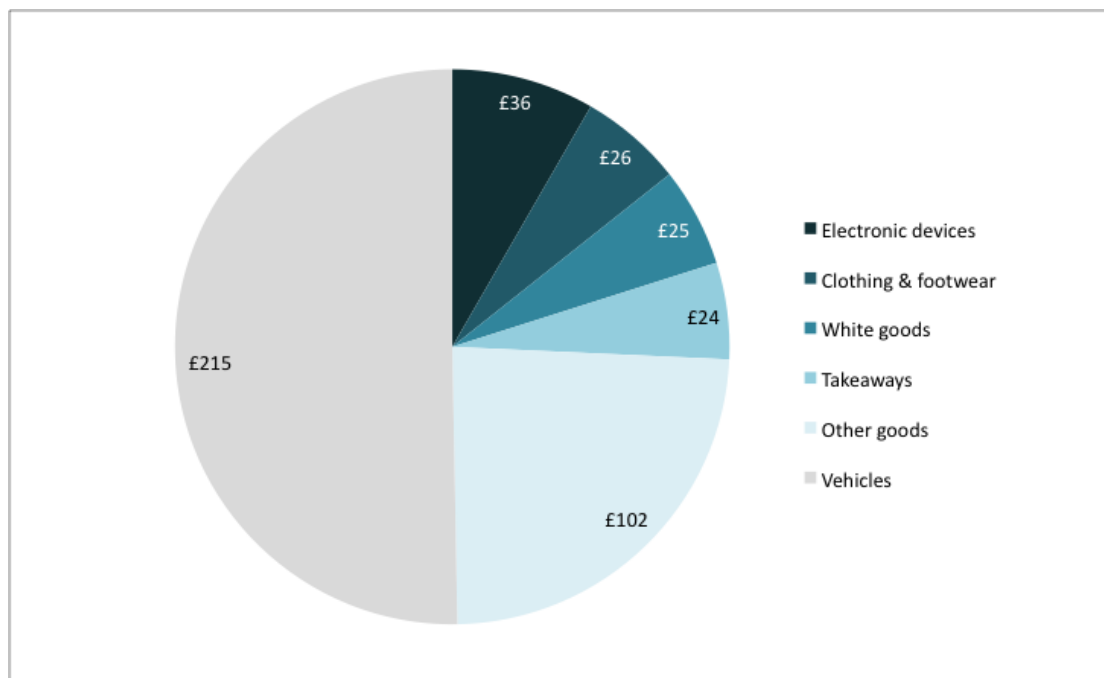
**Figure 1: Frequency of regret by product type**

The highest incidence of regret was found for “Clothing & Footwear” and “Takeaways”, which had been regretted by the majority of people who had purchased these products (60% and 53% respectively), with approximately 40% reporting that they had regretted buying these items in the last year. Relatively high regret for “Sports & exercise equipment” and “Kitchen gadgets” (both regretted by just over 40% of purchasers) could be due to the fact that people fail to use them as much as they intended to. Amongst the food items, the propensity to regret was highest for relatively unhealthy food such as “Takeaways” (already mentioned) and “Confectionary” (regretted by 37% of purchasers) but relatively low for high environmental impact items such as milk (shown to be the largest contributor to the embodied green house gas emissions associated with British food waste (Chapagain and James, 2011) but regretted by just 13% of purchasers). Addictive products, such as “Tobacco” and “Confectionary” were the most repeatedly regretted purchases, regretted “*More than a couple of times in the last year*” by 17% and 14% of purchasers respectively. Overall regret appears to demonstrate a disconnect between who we are and who we aspire to be, with regret stemming both from the gratification of immediate, but consequently

undesirable wants (e.g. takeaways, tobacco and confectionary) and from purchases that are too ambitiously virtuous (e.g. sports equipment and kitchen gadgets).

#### 4.2 Estimates of expenditure on regretted purchases

Using the methods outlined in Section 3.2 a rough estimate of expenditure on regretted purchases was obtained. Under the base case assumptions reported in Table 3 an estimated £10bn is spent annually by adults in Great Britain on purchases that they later regret. This estimate is highly uncertain but falls relatively low within the range of credible expenditure estimates (£5bn-£25bn) generated by applying the “*High price*” and “*Low price*” assumptions outline in Table 3. In total, regretted purchases accounted for a relatively small share of total expenditure: 1.7% in the base case, ranging between 0.8% and 4.1% in the low and high price case respectively. However, because the study focused on regretted expenditure on goods (respondents were not asked whether they had regretted spending money on services such as holidays) it is more appropriate to express the estimated expenditure on regretted purchases as a share of total expenditure on goods. Doing so more than doubles the proportions meaning that up to approximately 10% of expenditure on goods is regretted (4% in the base case, ranging between 1.2% - 9.7% across the range of prices considered).



**Figure 2: Annual household expenditure on regretted purchases by product type (base case assumptions)**

Closer to home, the £10bn base case assumption equates to £430 spent per household in the base case (£130 - £1,040 across the range of prices considered), per year on purchases that are later regretted. Figure 2 shows the breakdown of this expenditure and reveals that vehicles account for half of spending on regretted purchases under the base case assumptions. The next largest

expenditure categories were “Electronic devices”, “Clothing & footwear”, “White goods” and “Takeaways” respectively.

#### **4.3 The tendency to regret across different consumer groups**

Two logistic regressions – one on overall regret and one on product level regret - were run to ascertain the characteristics of consumers that are significantly more likely to report having regretted purchases. The results of the models are given in Table 5.

The range of pseudo  $R^2$  values reported in the caption of Table 5 suggest that, overall, Model 1 explains 4-6% of likelihood of a consumer having regretted at least one purchase at some point in the past (regardless of product type), and Model 2 explains 6-10% of the likelihood of a consumer having regretted a purchase across within each of the 20 product types considered by the study. These low values of  $R^2$  are problematic as they suggest that there are missing variables: if the specification of the model were improved, the estimated coefficients may change significantly. Nevertheless low  $R^2$  values are not uncommon in the social sciences where it is not possible to fully specify models and where there may be measurement error relating to attitudinal variables.



Dependent variable:	Model 1			Model 2		
	Overall regret (have regretted=1; never regretted =0)			Product regret (have regretted=1; never regretted =0)		
Explanatory variables:	$\beta$ (SE)	Odds ratio	95% OR CI	$\beta$ (SE)	Odds ratio	95% OR CI
Intercept	2.76*** (0.21)	15.80	10.55-24.07	-0.12 (0.08)	0.88 (1.08)	0.77-1.01
Gender (male relative to female)	-0.13 (0.24)	0.88	0.69-1.11	0.12*** (0.03)	1.13 (1.03)	1.08-1.19
Age (increasing scale)	-0.03*** (0.28)	0.78	0.71-0.85	-0.18*** (0.01)	0.83 (1.01)	0.82-0.85
Social grade (C2DE relative to ABC1)	-0.33** (0.12)	0.72	0.57-0.91	-0.06* (0.03)	0.94 (1.03)	0.90-0.99
Shopping enjoyment (decreasing scale)	-0.01 (0.01)	0.99	0.98-1.00	-0.01** (0.003)	0.99 (1.00)	0.99-1.00
Cost consciousness (decreasing scale)	-0.02** (0.01)	0.98	0.96-0.99	0.01* (0.003)	1.01 (1.00)	1.00-1.01
Clothing & footwear		N/A		1.36*** (0.08)	3.88 (1.09)	3.35-4.49
Newspaper, books & stationary		N/A		-0.10 (0.09)	0.91 (1.09)	0.78-1.06
Electronic devices		N/A		0.27** (0.08)	1.31 (1.09)	1.13-1.52
Kitchen gadgets		N/A		0.68*** (0.09)	1.97 (1.09)	1.68-2.30
White goods		N/A		-0.26** (0.09)	0.77 (1.10)	0.66-0.91
Sports & exercise equipment		N/A		0.67*** (0.10)	1.96 (1.10)	1.66-2.32
Gardening & DIY equipment		N/A		0.22* (0.09)	1.25 (1.09)	1.06-1.46
Arts, crafts & other hobby equipment		N/A		0.33*** (0.09)	1.39 (1.10)	1.18-1.64
Baby & children's toys & equipment		N/A		0.23* (0.10)	1.25 (1.11)	1.04-1.51
Cosmetics, health & beauty goods		N/A		0.60*** (0.09)	1.81 (1.09)	1.56-2.12
Vehicles		N/A		0.11 (0.09)	1.12 (1.09)	0.96-1.32
Fresh fruit & vegetables		N/A		-0.08 (0.09)	0.92 (1.09)	0.80-1.07
Confectionary		N/A		0.39*** (0.08)	1.47 (1.09)	1.27-1.70
Milk		N/A		-1.11*** (0.10)	0.33 (1.11)	0.27-0.39
Meat		N/A		0.03 (0.09)	1.03 (1.09)	0.89-1.20
Takeaways		N/A		1.01*** (0.08)	2.75 (1.09)	2.37-3.19
Alcohol		N/A		Contrast variable		
Tobacco		N/A		0.57*** (0.12)	1.76 (1.13)	1.42-2.17
Other grocery items		N/A		0.10 (0.09)	1.11 (1.09)	0.95-1.29
Other goods		N/A		0.43*** (0.09)	1.54 (1.09)	1.33-1.80

**Table 5: Binary logistic regressions on the log odds of overall regret (Model 1) and product level regret (Model 2).** Model 1:  $n=1,989$ ;  $\chi^2(5)=69.5$ ,  $p=1.3e^{-13}$ ;  $R^2(\text{Hosmer \& Lemeshow})=0.04$ ;  $R^2(\text{Cox \& Snell})=0.04$ ;  $R^2(\text{Nagelkerke})=0.06$ . Model 2:  $n=28,286$ ;  $\chi^2(25)=2127$ ,  $p=0$ ; results above are corrected for over-dispersion;  $R^2(\text{Hosmer \& Lemeshow})=0.06$ ;  $R^2(\text{Cox \& Snell})=0.07$ ;  $R^2(\text{Nagelkerke})=0.10$ . Significance: \* $p<.05$ , \*\* $p<.01$ , \*\*\* $p<.001$ . Respondents who selected "Never bought" or "Don't know" were excluded from the sample in both models.

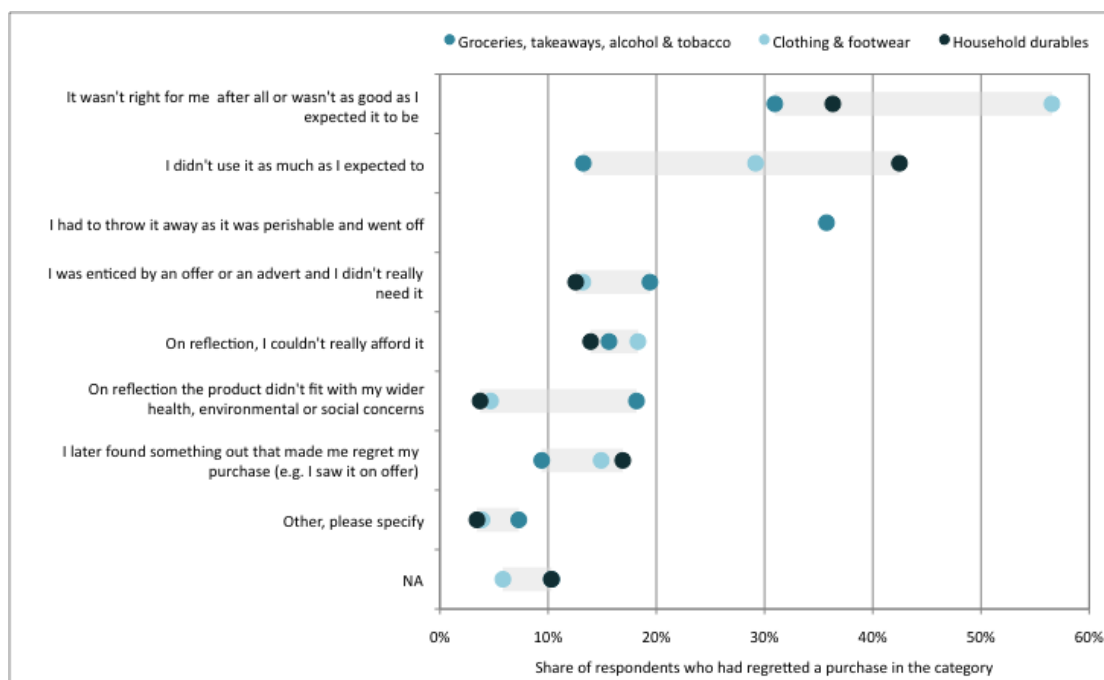
The following relationships were identified between self-report regret and the set of socio-demographic and attitudinal variables considered:

- **Regret reduces with age:** This finding is highly significant (99.9% significance level) across both models. Model 2 shows that moving up an age category (18-24, 25-34, 35-44, 45-54, 55+) reduces the likelihood of having regretted the purchase by 17% (15-18% at the 95% significance level). This finding is consistent with the idea that people learn from their regrets and become better at choosing their purchases with age. The effect is even more pronounced in Model 1, which does not separately control for product type, suggesting that older people are more likely to buy lower regret items.
- **White-collar workers have more regrets:** Social grade is a socio-demographic variable used by the UK Office of National Statistics to classify people according to occupation. The group ABC1 is assigned for managerial, administrative or professional occupations and the group C2DE for skilled and unskilled manual workers, state pensioners, widows and casual workers. Across both models, people in social grade C2DE are less likely to regret purchases than people in social grade ABC1. This finding is significant across the two models but is more pronounced in Model 1 before controlling for product type in Model 2. The results of Model 2 show that people in group C2DE are 6% (1-10% at the 95% significance level) less likely to have regretted a purchase within a product group once controlling for product type. Social grade is an indicator of affluence suggesting that less affluent people have fewer regrets. One possible explanation for this is that less affluent people deliberate more over their purchases and so are less likely to regret them.
- **People who enjoy shopping are marginally more likely to regret purchases once controlling for differences in product type:** Stronger agreement with the statement “I enjoy shopping, even when I’m not looking for something in particular” significantly increased the probability of regretting a purchase in Model 2, although the likelihood of regret was only increased by 1% (0-1% at the 95% significance level).
- **Men are significantly more likely to regret purchases once controlling for differences in regret by product type:** Model 1 had a negative gender coefficient suggesting that women are marginally (but not significantly) more likely to regret purchases than men. Model 2 reveals that, once controlling for differences in product type, men are 13% (8-19% at the 95% significance level) more likely to regret purchasing a product than women. The difference in findings across the two models is consistent with idea that men are less likely to buy high regret items such as clothing.
- **The effect of cost-consciousness on regret is marginal and the sign of the relationship depends on the model chosen:** In Model 1 people who expressed greater agreement with the statement “I’m very conscious of cost and finding the cheapest option is my number one priority” are significantly more likely to regret purchases. Controlling for product type in Model 2 changes the sign of this relationship, suggesting that people who are cost conscious are less likely to regret purchases. In both cases the magnitude of the effect is small: 2% (1-

4% at the 95% significance level) in Model 1 and 1% (0-1% at the 95% significance level) in Model 2. These findings appear to suggest that cost consciousness is not the primary driver of product regret.

#### 4.4 Reasons for regret

Respondents who had regretted purchases were asked why this was the case. The 20 product categories reported in Figure 1 were condensed into three overarching product groups. For each product group, respondents could select as many reasons as applied to them from a list. They were also given the opportunity to specify other reasons for regretting these purchases. Figure 3 shows the relative importance of different reasons for regret across three broad product groups.



**Figure 3: Reported reasons for regret (respondents were asked to choose all options that applied)**

As shown in Figure 3, the most common reason for regret differed across the broad product groups. The main reason (reported by 36% of respondents) for regretting groceries was that they went off and had to be thrown away; items of clothing and footwear were primarily regretted (by 57% of respondents) because they were not right after all or were not as good as expected; and the main reason (felt by 42% of respondents) for regretting the purchase of household durables was that they didn't use them as much as expected.

Relatively few respondents (3-7%) chose to specify other reasons for regret. Most of these responses offered more detailed explanations for the pre-specified reasons for regret mentioned above. For *Household durables* the reasons given mainly related to product quality: 68% of people reported concerns such as “It broke”, “Had major problems keeping it working” and “Crap car”. Within the *Groceries, takeaways, alcohol & tobacco* category the greatest source of other

reasons for regret (stated by 35% of those who responded to the question) involved health concerns e.g. *“Should have cooked something healthier rather than giving in to takeaway”*, *“Trying to stop smoking”*, *“Dieter’s nightmare”* and *“Drink too much!”*. Finally, within the *Clothing & footwear* category the main stated source of regret (mentioned by 51% of those who responded to the question) related to buying the wrong size: *“I’m fat it was thin”* and *“Got size wrong”*. Across all product groups 8-14% of stated responses could not be re-categorised into the seven reasons for regret offered in the survey. Within this group of responses there were two main sources of regret. Firstly regret relating to poor customer service: *“Wrong size was sent”*, *“Takeaway was cold”* and *“I was sent the wrong order twice”*. Secondly regret relating to the influence of other people on choices: *“Went with my husband’s choice not mine”*, *“I was persuaded by someone else”* and *“Advised by sales staff/friends/family that it was a good choice - this was not so”*.

One question of interest both to the marketing community – concerned with selling products – and to those concerned with the environmental burden of products is whether people regret purchases because they would have preferred to buy an alternative product, or whether they regret the purchase per se i.e. wish that they had not bought the product at all. This question was not put to respondents directly, however, some indication of the relative importance of these two different types of regret can be obtained by classifying the reasons for regret offered in the survey according to whether they would appear to suggest regret for the purchase or regret for the choice.

	Re-evaluated need	Regretted choice
Groceries, takeaways, alcohol & tobacco	51%	58%
Clothing & footwear	38%	75%
Household durables	50%	57%

**Table 7: Regretted purchases v. choices (share of respondents that had regretted purchases)**

By categorising responses using the methods outlined in Section 3.2, Table 7 shows the relative importance of *“Re-evaluated need”* and *“Regretted choice”* for the three broad product groups. The table shows that, although a larger share of respondents cited reasons relating to regretted choices, reasons relating to regretted purchases were also very prevalent - cited by approximately half of respondents who had regretted buying *“Groceries, takeaways, alcohol & tobacco”* and *“Household durables”*. This was the case even though the category *“Regretted choice”* was given precedence in Table 4. Of course these survey results say nothing about how money saved from not buying products that are later regretted would eventually be spent..

## 5. Discussion

This paper has identified that the vast majority of adults in Great Britain have regretted purchases at some point in the past (82%) and that the majority (68%) have regretted at least one purchase in the last year. These findings are interesting firstly because they suggest that there is a degree of self-assessed over-consumption that, if reduced, could help to reduce pressures on the environment, and secondly because they call into question the assumption, common across many economic models, that the current level of demand is necessarily desirable. In order to elaborate on these findings, the next section (Section 5.1) draws together some preliminary policy implications of this study and the final section (Section 5.2) offers some suggestions for further work in this area.

### 5.1 Preliminary policy implications

As explained in the literature review (Section 2.3) the characterisation of regret in the academic literature has shifted from regarding regret as a psychological error, to regarding regret as a useful behavioural regulator. Within the field of policy, the analogous interpretation is to see regret either as a market failure (caused for example by a lack of information) that could be used to justify “nudge” style interventions, or seeing regret as a useful instrument of change that could be used to influence decision- making (e.g. prompting people to reflect on their regretted purchases could motivate them to act to avoid future regrets).

This paper has identified that post-purchase regret is widespread, with the vast majority of adults recalling instances of regretted purchases. This finding, coupled with the insight that regret is a useful behavioural regulator, begs the question whether regret could be used as a “hook” to prompt consumers to re-evaluate their consumption choices. For example, the food sector is responsible for just under a third of global emissions (Bajželj et al., 2013). Previous studies have demonstrated that a switch to healthier, lower meat, diets would allow GHG emission reduction targets to be met despite growing populations (Tilman and Clark, 2014). The significant regret for purchasing unhealthy foods identified in this study may be helpful in trying to make this global finding resonate at the individual level.

### 5.2 Suggestions for further work

By surveying post purchase regret, this study has offered an initial insight into the tendency and extent of people’s regret. Further work is required to fully understand the nature of people’s regrets and their implications for the environment and the cost of demand reduction. In particular:

- **In depth analysis of causes of regret:** Including distinguishing between groups of people that have a higher/lower propensity to regret purchases and types of purchases that are more likely to be regretted. For example, whether regret is more likely for more expensive

product choices (because they stretch budgets) or cheaper product choices (because they are of lesser quality) and whether the wider social drivers of demand (Veblen, 1899) ultimately herald private regrets as goods have less intrinsic value to their owners. As well as analyzing whether people reevaluate their regrets over time, building on Appadurai (1986)'s notion that the value placed on goods changes and evolves "*in their forms, their uses, their trajectories*" pp.5.

- **In depth analysis of counterfactuals:** Including an understanding of alternative, preferred consumption patterns. If money saved from avoiding regrets were spent, for example, on emissions intensive holidays, similarly to the rebound effects observed following improvements in energy efficiency (Sorrell et al., 2009), this could have the perverse effect of increasing emissions. Alternatively if the fear of regretting purchases acts as a disincentive to consumption, improving the way that we manage our regrets could actually act to increase consumption.
- **An assessment of the environmental impact of regretted purchases:** An environmentally extended Multi-Regional Input-Output framework has been used in the past, for example by Barrett et al. (2014), to estimate the GHG emissions associated with UK consumption activity. Informed by the above, this type of analysis could be extended to show the share of consumption activity (and consequent impacts) that is ultimately regretted.
- **Better models of the cost of demand reduction:** This study has found that between 2-10% of expenditure on goods is later regretted, suggesting that there are some opportunities to reduce demand at a lower welfare cost. There is an opportunity to build a wider challenge to the treatment of demand in economic models by critically examining the three common assumptions that limit the characterisation of demand-side change: (1) viewing utility as being solely/predominantly derived from consumption; (2) focusing on price-induced changes in demand rather than the wider context of decision making; and, (3) assuming given, stable preferences. Alternative modelling frameworks, such as agent-based models, that are not wedded to the assumptions of neoclassical economics are likely to be better suited to this task.

This paper has provided some preliminary findings on the prevalence of regretted purchases across the population of Great Britain in the hope of stimulating a more nuanced approach to assessing the cost of demand reduction.

### Supplementary Information

The underlying survey data is available via the UKERC datacenter (<http://ukedc.rl.ac.uk/>).

Supplementary data to this article can be found online at

<http://dx.doi.org/10.1016/j.ecolecon.2016.06.028>.

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